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Optical properties of the synthesized ZnO with ion implanted silver nanoparticles

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Abstract

© 2015, Pleiades Publishing, Ltd. The implantation results of a thin ZnO film formed by vacuum magnetron sputtering when irradiated by Ag^+ ions with an energy of 30 keV, radiation dose of 1.5 × 1017 ion/cm^2, and current density of 1 τA/cm^2 are presented. Analysis of the composite layer was carried out using a scanning electron microscope and by measuring the linear optical transmission and nonlinear optical absorption in the Z-scanning mode at a laser wavelength of 780 nm, pulse duration of 150 fs, and power of 50 mW. The appearance of a characteristic optical plasmon resonance band indicates the formation of silver nanoparticles in the subsurface of irradiated ZnO. The presence of simultaneous saturated and two-photon nonlinear absorption under femtosecond laser irradiation was established for this composite material.

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